

CHALLENGES OF IMPLEMENTING THE DOUBLE-CRESTED CORMORANT ENVIRONMENTAL IMPACT STATEMENT

KRISTINA CASSCLES GODWIN, USDA, APHIS, Wildlife Services, P.O. Drawer FW, Mississippi State, MS 39762, USA

TOMMY KING, USDA, APHIS, Wildlife Services, National Wildlife Research Center, P.O. Drawer 6099, Mississippi State, MS 39762, USA

PETER BUTCHKO, USDA, APHIS, Wildlife Services, 2803 Jolly Road, Suite 160, Okemos, MI 48864, USA

RICHARD CHIPMAN, USDA, APHIS, Wildlife Services, 1930 Route 9, Castleton, NY 12033, USA

Abstract: Double-crested cormorant populations have increased over the last 20 years within the continental United States. Problems associated with this increase include impacts to commercial aquaculture, damage to property, vegetation, recreational fisheries, and natural resources, as well as concerns over inter-specific competition. Implementation of the forthcoming Environmental Impact Statement for the management of double-crested cormorants will be a monumental task. Several state and federal agencies, along with private citizens and various interest groups will have parts to play. USDA/APHIS/Wildlife Services is expected to have a large part in the implementation of the plan. We discuss the proposed actions to be taken by USDA/APHIS/Wildlife Services, including population reduction measures as well as monitoring population status and reduction of damages caused by double-crested cormorants.

Key words: double-crested cormorant, Environmental Impact Statement, management, *Phalacrocorax auritus*.

Proceedings of the 10th Wildlife Damage Management Conference. (K.A. Fagerstone G.W. Witmer, Eds). 2003

INTRODUCTION

Wintering double-crested cormorant (*Phalacrocorax auritus*) populations in the southeastern United States have increased over the past 20 years (Glahn and Stickley 1995; Glahn et al. 2000b; Jackson and Jackson 1995). Concurrent with increasing cormorant numbers has been an increase in requests for assistance, primarily from commercial aquaculture producers within the Southeastern United States. In recent years, requests for assistance have been documented from WS in northern states with regards to decreased recreational fisheries,

damage to property, vegetation, and natural resources, as well as concerns over inter-specific competition. Little conclusive scientific evidence has been readily available with regards to impacts of double-crested cormorants (DCCO) on recreational fisheries (Lewis 1929, Mendall 1936, Milton and Austin-Smith 1983, Craven and Lev 1987, Hobson et al. 1989, Ludwig et al. 1989, Weseloh and Ewins 1994, Blackwell et al. 1995, Bur et al. 1999) as well as habitat degradation on traditional nesting and roosting areas (Weseloh and Ewins 1994, Chapdelaine and Bédard 1995, Wires

et al. 2001). Currently research is being conducted on DCCO impacts to free ranging fish stocks.

Oversight for damage management and requests for assistance regarding DCCOs resides with USDA-APHIS-Wildlife Services (WS), in coordination with the United States Fish and Wildlife Service (USFWS) and State fish and wildlife agencies. To assist commercial aquaculture producers in managing site specific damage and reduce bureaucracy, a USFWS DCCO Depredation Order was established in 1998. The DCCO Depredation Order authorizes commercial freshwater aquaculture producers in the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Minnesota, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee and Texas, to kill DCCOs, without a Federal permit, when birds are committing, or about to commit, depredations to aquaculture stocks. Producers must be currently conducting non-lethal harassment programs certified by WS before they can act under the Depredation Order.

Even with the Depredation Order in place, requests for assistance and economic impacts from DCCOs increase every year. During 2001-2002, the USFWS, in cooperation with WS, has been preparing an Environmental Impact Statement (EIS) to address problems and concerns regarding DCCOs. This paper discusses alternatives within the EIS and outlines possible implementation strategies currently being considered by WS.

BACKGROUND

DCCOs have been negatively impacting commercial aquaculture producers since the mid-1980's (Wywiałowski 1999, CEAH 1997a, 1997b, Stickley and Andrews 1989). Impacts include loss of fish due to predation and

spread of disease. Since 1989, WS has conducted cormorant roost counts and population surveys throughout the Delta region of Mississippi. The first coordinated regional population survey conducted in 1989 was done on 12 roosts and 28,584 cormorants were counted. In 2003, the DCCO population was estimated at 55,000 birds among 85 roost sites (Mississippi Wildlife Services, unpublished data). Population estimates have been estimated as high as 74,000 in previous years. Due to increased aquaculture production, primarily catfish, birds are accumulating more fat and arriving at their breeding grounds in better breeding condition than cormorants wintering in non-aquaculture areas (Glahn et al. 2000).

Once on the Interior nesting grounds, which extend from Lake Ontario to Alberta (Tyson et al. 1999), cormorants produce an average of 3-4 eggs per clutch (Mendall 1936, Van der Veen 1973, Mitchell 1977, Peck and James 1983, Pilon et al. 1983, Weseloh and Ewins 1994), with a hatching success of 50-75 percent (Drent et al. 1964, Van der Veen 1973, Pilon et al. 1983, Wires et al. 2001). Cormorants may begin breeding at 2-3 years (Van der Veen 1973, Johnsgard 1993, Weseloh and Ewins 1994) and survive an estimated 6.1 years (Van der Veen 1973). Current Interior population estimates are 1 - 2 million birds (Tyson et al. 1999).

Commercial aquaculture within the southeastern United States has grown tremendously within the last two decades, with fresh and salt water acreage estimated at 168,213 ha (USDA 2000). If one cormorant eats 1 lb of fish per day (Glahn and Brugger 1995), 2 million birds can have a very large impact if they foraged exclusively on aquaculture facilities. This is the case with many cormorants during the winter months in the southeastern U.S. Individual producers spend thousands of

dollars per year in both non-lethal and lethal techniques to minimize losses to DCCOs. During an average winter in the Delta region of Mississippi, losses to the catfish industry alone can be \$5 million dollars in lost fish due to cormorant predation (Glahn et al. 2000b).

DISCUSSION OF IMPLEMENTATION OF ALTERNATIVES WITHIN THE EIS

Several alternatives have been proposed within the EIS. These will be discussed from WS's perspective.

A. No Action (continue existing DCCO damage management policies). This Alternative will not decrease the number of requests for assistance currently being received by the agency. WS has been using these methods for over 14 years along with developing new non-lethal techniques. Producers are also using the Depredation Order. Requests for assistance and bird numbers continue to increase yearly.

B. Non-lethal management (do not allow lethal management actions). WS encourages the use of non-lethal techniques and requires these techniques to be used before lethal control options are initiated. This alternative does not allow for the reduction of bird numbers. Birds will be moved from site to site for short durations of time. Habituation to current methods with this alternative will likely occur. Birds will become used to non-lethal techniques with no re-enforcement using lethal control.

C. Increased local damage control (expand current wildlife damage management policy). This alternative would allow for enhanced use of increased methods for lethal control but not at a scale to control local population numbers. Expansion of the current DCCO Depredation Order will not allow for take of enough birds to control population numbers. Winter roost management to reduce local DCCO numbers and associated impacts will assist some producers, but will not be effective enough

to take needed numbers of DCCOs (Glahn et al 2000a). Currently, it is very difficult to recruit and retain enough trained people to effectively harass DCCO roosts using non-lethal methods. If the agency (WS) receives inadequate additional assistance with this alternative, producers will have to furnish their own firearms and shells to take DCCOs within roost sites. If current depressed market conditions for farm raised catfish continue, many producers will not utilize this alternative in the southeast. The cost to producers implementing a shooting program would cut into already significantly decreased profits impacting the industry.

D. Public resource depredation order (establish a new depredation order to address public resource conflicts – USFWS Proposed Action). This alternative gives more freedom and latitude to kill birds, but it does not provide for a mechanism or strategy to meet regional population goals. This alternative does not do enough to manage regional DCCO numbers and associated impacts. This alternative only addresses DCCO problems on a site by site basis. Some problems being caused by DCCOs will continue with little resolution. Regional population goals still need to be addressed. An actual population management plan for reducing current numbers is lacking. Development of a management plan by WS would continue to involve verification of non-lethal harassment methods being used by aquaculture producers currently covered under the Depredation Order, and expand to public lands and waters where DCCOs are injurious to public resources. Roost shooting would be allowed, but the same scenario described under Alternative C (difficulty in shooting birds on roosts) would exist under this Alternative. Additional resources would be required for WS to implement and monitor the efficacy of this

alternative on additional public lands and waters.

E. Regional population reduction (develop and implement management actions to attain population objectives aimed at reducing overall DCCO populations – WS preferred alternative). On July 6, 2001, WS adopted a position statement regarding DCCOs. WS supports a DCCO management strategy that reduces the population of DCCOs at the national, regional and local level in order to reduce damage and negative impacts to aquaculture and hobby fisheries; natural resources, including wild fisheries; property; and human health and safety. This strategy would allow use of all efficacious damage management methods at nesting, roosting, wintering and all other applicable sites where DCCOs are found. Management decisions would be based on the best available scientific data. The agency believes the current depredation permitting process and depredation order for aquaculture should be revised to simplify and enhance population reduction objectives. The management plan resulting from the EIS would be developed jointly by federal and state agencies.

There are several questions that need to be answered if Alternative E is implemented. First and foremost is to determine what the current population of DCCO's is, and what our population objectives are in order to meet our population management goals. This population goal will have to be both biologically and socially acceptable. Every three to five years, a comprehensive population survey would be conducted to monitor the efficacy of these population control methods. This will be a monumental task involving numerous agencies, organizations and individuals.

Another need will be to document all population reduction methods and efficacy

of population control methods. Data would be collected before, during and after implementation of the EIS and Federal Register Notice. DCCO population numbers, growth rate or reduction, and demographics will need to be determined and monitored to assist with population modeling and determining the efficacy of the alternative. The economic, social, and aesthetic impacts of this alternative to cooperators (aquaculture producers, anglers, conservation organizations, general public, etc.) will also need to be monitored. Research must be conducted to further define cormorant movements and food habits on the breeding grounds.

Answering key research and management questions and conducting population control is a complex task. There are wintering, coastal, southern and Delta bird populations, as well as northern breeding ground populations, including those in the U.S. and Canada. A large portion of birds move into the Provinces of Quebec and Ontario to breed and nest. Knowing what is happening in those areas would be of great assistance in managing the Interior population of DCCO's. It is currently unclear what role the Canadian Provincial Governments will play with management of Interior DCCO populations.

Various steps need to be considered without delay if the EIS and Federal Register Notice give WS authority to conduct roost control work during winter months. Coordination will be a key factor. Meetings will need to be set up with commercial aquaculture producers and interested landowners for conducting roost shoots. Flights will need to be conducted almost weekly to monitor number of birds in roost sites. These flights will determine which roosts have birds, thus reducing chances of going to a site which may not need to have action taken. Timing of waterfowl seasons needs to be taken into

consideration for most southern states. It will be important for lethal roost control to be conducted in the most professional, responsible, and safe manner possible. Some southern states may not require the same effort based on number of roosting sites and aquaculture facilities.

Breeding ground work will need to begin with getting permission from landowners to conduct lethal control work at nesting sites. The largest portion of this work will probably need to occur in the Great Lake States and Provinces, and the Prairie Pothole region of Manitoba. Input from fisheries biologists across these regions will be important in determining if recreational fisheries populations improve as DCCO populations are reduced. In some cases, permission to work on private lands may best be coordinated through Sport Fishing Associations. Population reduction work may consist of egg oiling, nest destruction, euthanizing nestlings and culling adult birds. From population modeling work done by Blackwell et al. (2002), it appears 3-year old and older birds need to be culled to have a direct and effective reduction in population numbers. Removal of dead birds will need to be conducted on all sites, as will catching and disposing of crippled birds.

If WS is given authority to prevent formation of new colonies from becoming established, site monitoring will need to be conducted so these sites can be located and eliminated. This will need to be done on both wintering and breeding grounds.

F. Regulated Hunting (establish frameworks for a hunting season on DCCOs). Regulated hunting will not draw enough interest from the hunting public to adequately reduce populations of DCCOs. Hunters may randomly shoot cormorants while hunting for other more desirable species of waterfowl, but few hunters can be expected to go out and strictly hunt for

DCCOs. This alternative will have little impact on reducing damage caused by DCCOs across the Interior population. This alternative does provide another tool that could assist in reducing population numbers in conjunction with other alternatives.

SUMMARY

Management of the DCCO Interior population will take an extraordinary amount of cooperation, coordination, management, research, information, education and work from a number of individuals and agencies. Population monitoring before, during and after implementation of any of the alternatives listed within the EIS will be critical to determine effectiveness of implementation. In order to most effectively address growing cormorant problems and damage associated with this species, WS fully supports Alternative E, Regional Population Reduction.

ACKNOWLEDGMENTS

We thank the USFWS for taking the lead in developing the DCCO EIS. The National Wildlife Research Center has provided years of intensive research on DCCOs which has assisted in bringing about information for the EIS. Thanks to all of the WS State Directors who provided feedback for the EIS. This feedback greatly assisted in the development of this paper.

LITERATURE CITED

- BLACKWELL, B.F., W.B. KROHN, AND R.B. ALLEN. 1995. Foods of nestling double-crested cormorants in Penobscot Bay, Maine, USA: temporal and spatial considerations. *Colonial Waterbirds* 18:199-208.
- _____, M.A. STAPANIAN, AND D.V. WESELOH. 2002. Dynamics of the double-crested cormorant population on Lake Ontario. *Wildlife Society Bulletin* 30:345-353.
- BUR, M.T., S.L. TINNIRELLO, C.D. LOVELL, AND J. TYSON. 1999. Diet of the double-crested cormorant in western Lake Erie. Pages 73-85 in M.E. Tobin, Technical coordinator.

- Symposium on double-crested cormorants: population status and management issues in the Midwest. United States Department of Agriculture, Animal and Plant Health Inspection Service Technical Bulletin 1879, Washington D.C., USA
- CEAH (Centers for Epidemiology and Animal Health). 1997a. Catfish 1997: Part I. Reference of 1996 U.S. catfish health and production practices. United States Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Fort Collins, CO. USA
- _____. (Centers for Epidemiology and Animal Health). 1997b. Catfish 1997: Part II. Reference of 1996 U.S. catfish management practices. U.S. Department of Agriculture, Animal Health Inspection Service, Veterinary Services, Fort Collins, CO, USA.
- CHAPDELAINE, G. AND J. BÉDARD. 1995. Recent changes in the abundance and distribution of the double-crested cormorant in the St. Lawrence River, estuary and gulf, Quebec, 1978-1990. *Colonial Waterbirds* 18 (Special Publication 1):70-77.
- CRAVEN, S.R. AND E. LEV. 1987. Double-crested cormorants in the Apostle Islands, Wisconsin, USA: population trends, food habits, and fishery depredations. *Colonial Waterbirds* 10:64-71.
- DRENT, R., G.F. VAN TETS, R. TOMPA, AND K. VERMEER. 1964. The breeding birds of Mandarte Island. *Canadian Field-Naturalist* 78:208-263.
- GLAHN, J.F. AND K.E. BRUGGER. 1995. The impact of double-crested cormorants on the Mississippi delta catfish industry: a bioenergetics model. *Colonial Waterbirds* 18 (Special Publication 1):168-175.
- _____, AND A.R. STICKLEY, JR. 1995. Wintering double-crested cormorants in the Delta Region of Mississippi: population levels and their impact on the catfish industry. *Colonial Waterbirds* 18 (Special Publication 1): 137-142.
- _____, J.F., M.E. TOBIN, AND J.B. HARREL. 2000. Possible effects of catfish exploitation on overwinter body condition of double-crested cormorants. Pages 107-113 in Mark E. Tobin, Technical Coordinator. Symposium on double-crested cormorants: population status and management issues in the Midwest. United States Department of Agriculture, Animal and Plant Health Inspection Service Technical Bulletin 1879, Washington, D.C., USA
- _____, _____. AND B.F. BLACKWELL. 2000a. A science-based initiative to manage double-crested cormorant damage to southern aquaculture. United States Department of Agriculture, Animal and Plant Health Inspection Service Publication 11-55-010, Washington, D.C., USA.
- _____, D.S. REINHOLD, AND C.A. SLOAN. 2000b. Recent population trends of double-crested cormorants wintering in the delta region of Mississippi: Responses to roost dispersal and removal under a recent depredation order. *Colonial Waterbirds* 23(1):38-44.
- HOBSON, K.A., R.W. KNAPTON, AND W. LYSACK. 1989. Population, diet and reproductive success of double-crested cormorants breeding on Lake Winnipegosis, Manitoba, in 1987. *Colonial Waterbirds* 12:191-197.
- JACKSON, J.A. AND B.J.S. JACKSON. 1995. The double-crested cormorant in the south-central United States: habitat and population changes of a feathered pariah. *Colonial Waterbirds* 18 (Special Publication 1):118-130.
- JOHNSGARD, P.A. 1993. Cormorants, darters, and pelicans of the world. Smithsonian Institution Press, Washington, D.C., USA.
- LEWIS, H.F. 1929. The natural history of the double-crested cormorant (*Phalacrocorax auritus auritus* L.). Ru-Mi-Lou Books, Ottawa, Ontario, Canada.
- LUDWIG, J.P., C.N. HULL, M.E. LUDWIG, AND H.J. AUMAN. 1989. Food habits and feeding ecology of nesting double-crested cormorants in the upper Great Lakes, 1986-1989. *Jack-Pine Warbler* 67:117-129.
- MENDALL, H.L. 1936. The home-life and economic status of the double-crested cormorant, *Phalacrocorax auritus auritus* (Lesson). University of Maine Studies, Second Series, no. 38. Maine Bulletin 39.3. University Press, Orono, ME, USA.
- MILTON, G.R. AND P.J. AUSTIN-SMITH. 1983. Changes in the abundance and distribution of double-crested (*Phalacrocorax auritus*) and great cormorants (*P. carbo*) in Nova Scotia. *Colonial Waterbirds* 6:130-8.
- MITCHELL, R.M. 1977. Breeding biology of the double-crested cormorant in Utah Lake. *Great Basin Naturalist* 37:1-23.
- PECK, G.K. AND R.D. JAMES. 1983. Breeding birds of Ontario, physiology and distribution. Vol. 1: Non passerines. Royal Ontario Museum, Toronto, Canada.
- PILON, C., J. BURTON, AND R. MCNEIL. 1983. Reproduction du Grand Cormoran (*P.*

- carbo*) et du Cormoran à aigrettes (*P. auritus*) aux îles de la Madeleine, Québec. Canadian Journal of Zoology 61:524-530.
- STICKLEY, A.R., JR. AND K.J. ANDREWS. 1989. Survey of Mississippi catfish farmers on means, effort, and costs to repel fish-eating birds from ponds. Proceedings of the Eastern Wildlife Damage Control Conference 4:105-108.
- TYSON, L.A., J.L. BELANT, F.J. CUTHBERT, AND D.V. C. WESELOH. 1999. Nesting populations of double-crested cormorants in the United States and Canada. Pages 17-25 in M. E. Tobin, Technical Coordinator. Symposium on double-crested cormorants: population status and management issues in the Midwest. United States Department of Agriculture, Animal and Plant Health Inspection Service Technical Bulletin 1879. Washington, D.C., USA.
- USDA (United States Department of Agriculture, Economic Research Service). 2000. Aquaculture Outlook. LDP-AQS-11, Washington, D.C. March 2000.
- VAN DER VEEN, H.E. 1973. Some aspects of the breeding biology and demography of the double-crested cormorant (*Phalacrocorax auritus*) of Mandarte Island. Ph.D. thesis, University of Grönigen, Grönigen, The Netherlands.
- WESELOH, D.V., AND P.J. EWINS. 1994. Characteristics of a rapidly increasing colony of double-crested cormorants (*Phalacrocorax auritus*) in Lake Ontario: population size, reproductive parameters and band recoveries. Journal of Great Lakes Research 20(2):443-456.
- WIRES, L.R., F.J. CUTHBERT, D.R. TREXEL, AND A.R. JOSHI. 2001. Status of the double-crested cormorant (*Phalacrocorax auritus*) in North America. Final Report to United States Fish and Wildlife Service, Arlington, VA, USA.
- WYWIALOWSKI, A.P. 1999. Wildlife-caused losses for producers of channel catfish (*Ictalurus punctatus*) in 1996. Journal of The World Aquaculture Society 30:461-472.